

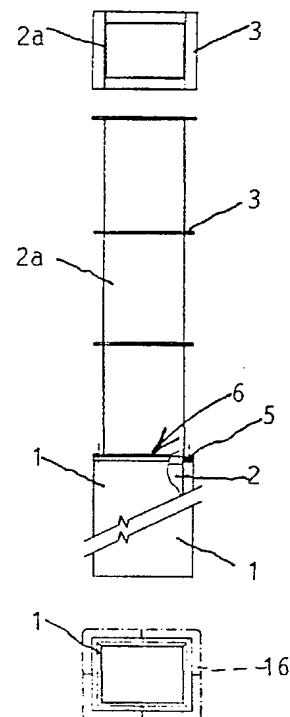


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: METHOD AND APPARATUS FOR FORMING CHEESE BLOCKS**(57) Abstract**

A tower block cheese forming apparatus and method. Known towers (1) of this type have been limited in height. This tower is of a height substantially greater than known towers and this enables increased through-put. The cheese column of this tower has a height extension (2) or (2a) provided on the perforated column (2) characteristic of these towers with in one embodiment the extension (2a) being free of any drain perforations (4). In a second embodiment the column extension including drain perforations (4). In this latter form the outer casing of the tower is also extended and the tower may be fabricated as a unitary body (1a). In a modification of the invention a column extension (2a) is provided together with a seal (5) which enables adaption of existing towers (1) to an increased height in accordance with this invention.



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TITLE: METHOD AND APPARATUS FOR FORMING CHEESE BLOCKS

TECHNICAL FIELD

This invention relates to an apparatus and a method for forming cheese blocks from cheese curd.

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BACKGROUND ART

A traditional method and apparatus for forming cheese blocks from cheese curd comprises feeding under vacuum prepared curd into a tower whereby the lower part of the curd is compressed with the weight of the curd thereabove. A guillotine type apparatus is provided at a lower end of the tower to sever off blocks of appropriately compressed cheese curd. Apparatus and methods of this type are described in various patents in several countries. UK Patents 1187964 and 1542844 describe some of the first such devices with various modified forms being disclosed in US Patents 3,982,480; 4,539,902 and UK Patent 2209266.

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This method and apparatus provides an essentially continuous method of making cheese blocks with often one or more towers, having a common input, being operated together. The effectiveness of the method and apparatus depends upon the through-put that can be achieved while maintaining a suitable block shape and finish at a consistent and required density. A draw-back or limitation with such apparatus has been the resistance factor between the descending curd and the containing column. This has led to fractures developing within the column particularly when the column is lowered in readiness to sever a block therefrom. The prior art devices including the aforesaid patents disclose means by which this problem and the associated requirements of achieving a desirable smooth surface finish and constant density can be substantially overcome.

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Consequently known apparatus such as that described in the first and earlier forms of this type of apparatus (for example as disclosed in UK Patents 1187964 and 1542844) and also the much latter apparatus of UK Patent 2209266 utilise a tower some 5.7 metres (approximately 16 feet) in height. The height of the towers have been limited as it was
5 envisaged that increasing the height would result in the resistance between the curd and the column also increasing to the extent the integrity of the curd could suffer. Published figures of such a tower indicate one block (nominal weight 20kgs) being produced every 1.5 minutes as an expected and desirable through-put.

10 A first object of this invention is to provide a cheese tower which enables a substantially increased production rate over known towers while maintaining, if not improving, the shape, finish and consistency of the resultant cheese blocks.

A further object of this invention is to provide a gasket seal which can be mounted between
15 a lower perforated column incorporating section of a cheese block tower and an upper non-perforated column extension of the tower. The gasket seal incorporates washing or "clean and place" means to facilitate washing of the lower section of the tower.

DISCLOSURE OF INVENTION

20 According to a first aspect of this invention there is provided a tower block cheese forming apparatus characterised in that the column to contain the curd is some 20% to 40% higher than known towers.

Accordingly to a second aspect of this invention there is provided a tower block cheese
25 forming apparatus as described in the preceding paragraph wherein an upper section of the column is substantially free of the drain perforations characteristic of a lower section of the column.

According to a third aspect of this invention there is provided a method of forming blocks of cheese from prepared cheese curd by utilising a tower block cheese forming apparatus as described in either of the preceding paragraphs.

- 5 According to a fourth aspect of this invention there is provided a gasket seal adapted to be retained between an upper non-perforated section and a lower perforated section of a cheese block forming column comprising a body having an opening therethrough with, in a first sealing face thereof a channel being formed, the channel extending substantially completely about the seal and being separated from the opening, except for a plurality of
10 passages conjoining them at intervals thereabout, by an inner wall formation of the seal, and at least one port adapted for connection to a wash line formed through the seal from an outer side thereof to conjoin with the channel.

- According to a fifth aspect of this invention there is provided a cheese tower comprising an
15 upright hollow tower incorporating a perforated column in adjacent spaced relationship to an inner face thereof and cheese block forming apparatus at a lower end thereof, characterised in that a non-perforated extension of the column is provided at the top of the perforated column and a gasket seal as described in the preceding paragraph is mounted between the two column sections with a flashing of the seal depending over an upper end of
20 the perforated column in so doing defining, with the inner side of the seal, a void therebetween conjoining the passages in the seal to the space between the inner face of the tower and the perforated column.

BRIEF DESCRIPTION OF THE DRAWINGS

- 25 Fig 1 is a partly schematic side elevation of a first embodiment of a cheese tower in accordance with this invention, and
Fig 2 is a close-up sectional side view of a second embodiment of the invention, and

Fig 3 comprises three views being a side elevation and the associated end elevations of a further embodiment of the invention, and

Fig 4 is a detail side view of the preferred perforations of the column, and

Fig 5 is a cross-sectional view of the sealing means between two column sections as
5 depicted on Fig 3.

BEST MODE FOR CARRYING OUT THE INVENTION

In further describing the invention reference is made to preferred embodiments thereof. In a first embodiment an existing tower 1 being one of a group of four towers such as described
10 in UK Patent 2209266 is adapted in accordance with this invention. The adaptation involves increasing the height of the cheese column by some 1.6 metres. The column extension 2a is fabricated from stainless steel sheet with bracing 3 about the periphery and does not include drain perforations 4. The column extension 2a is mounted on top of the existing tower 1 by way of a gasket seal 5 as described hereinafter. The column extension
15 2a is tapered to be marginally wider at the lower end than the upper end with the dimensions at the lower end matching those at the upper end of the existing tower 1. Curd feed, vacuum and cleaning lines already in situ are altered to accommodate the increased height of the tower.

20 Trials were conducted over a period of some 5 consecutive days and, in anticipation of increased throughput to simulate increased curd conveyance, one of the conventional towers of the group of four towers was turned off in order to build up an appropriate level or curd in the auger feed trough common to the towers. Also the pressing time in the tower was reduced from 30 seconds to 20 seconds. The trial showed that rates of one block
25 (20kg nominal size) could be achieved per minute and the block shape, finish and density were equal if not superior to what had been produced from the tower 1 prior to the modifications and to that being simultaneously produced by the unmodified towers in the

group. Also during the trial period the block weight consistency achieved showed worthwhile improvement to that being achieved in the unmodified towers of the group.

In mounting the column extension 2a to the existing tower 1 the gasket seal 5 is seated
5 between the two column sections 2 and 2a. The seal 5 is preferably fabricated from an ultra high molecular weight polyethylene in a rectangular shape with an opening 6 therethrough. The seal 5 is dimensioned to correspond to the dimensions of the block forming tower 1 to seat on an upper end thereof. Preferably the top end of the tower and the extension each incorporate external flanges 7 between which the seal 5 seats. The column sections 2 and
10 2a are mounted together through the flanges. An inner side 8 of the seal 5 is substantially aligned with the space 9 between an inner face of the tower and the associated perforated column.

A first sealing face of the seal 5, preferably the upper face 10, incorporates a channel 11
15 thereabout. The channel 11 is disposed adjacent to an inner side 8 of the seal 5 such as to be separated therefrom by an inner wall 12 formation of the seal 5. Passages 13 are provided to join the channel 11 to the inner side 8 of the seal 5. Preferably the passages 13 are formed by a series of notches formed at regular intervals in an upper edge of and about the inner wall 12 with the passages 13 providing a restricted opening. At least one port 14
20 and preferably four ports, one to each side of the seal 5, are provided, the ports 14 extending through the seal 5 to conjoin with the channel 11. The ports 14 are adapted to be coupled to the in situ washing or "clean in place" system 16, shown schematically in Figs 1 and 3.

25 A flashing 15 is provided to extend over the channel 11 and down the inner side 8 of the seal 5. A lower end section of the flashing 15 extends down the inside of an upper end of the perforated column 16 and is spaced marginally outward of the inner side 8 of the seal 5.

Thus the flashing 15 forms a void connecting the restricted passages 13 and thus the channel 11 and "clean and place" system to the space 9. The flashing 15 also prevents product, ie curd/whey, directly entering the space 9.

- 5 As depicted in Fig 1 a cheese tower 1a of an extended length according to this invention may be made with the column 2 as a unitary body. As in the case of extending an existing tower 1 the height can be some 20 - 40% higher than known towers. As with known towers 1 a lower and major section of the column 2 incorporates drain apertures 4 with preferably the apertures 4 being of a parabolic shape as depicted in Fig 4. An upper section
- 10 2a of the column 2 need not include drain perforations 4.

THE CLAIMS:

1 A tower block cheese forming apparatus characterised in that the column to contain the curd is some 20% to 40% higher than known block cheese towers.

5

2 A tower block cheese forming apparatus as claimed in claim 1 wherein an upper section of the column is substantially free of the drain perforations characteristic of a lower section of the column.

10 3 A cheese tower comprising an upright hollow column with a perforated lining in adjacent spaced relationship to an inner face thereof and cheese block forming apparatus at a lower end thereof, characterised in that a non-perforated extension of the column is mounted to the top of the perforated section thereof and a gasket seal is mounted between the two tower sections, the seal incorporating a channel adapted to be coupled to a wash
15 line and a flashing adapted to depend over an upper end section of the perforated column and in so doing defining with the inner side of the seal a void conjoining the channel in the seal to the space between the inner face of the tower and lining.

20 4 In an extended cheese block tower as claimed in claim 3 a gasket seal comprising a body having an opening therethrough with the channel formed in a first sealing face of the body, the channel extending substantially completely about the seal and being separated from the opening, save for a plurality of passages adjoining the opening and the channel at intervals about the channel, by an inner wall formation of the seal, and at least one port being formed through the seal to adapt the seal for connection to a wash line.

25

5 A method of forming blocks of cheese from prepared cheese curd by utilising a tower block cheese forming apparatus incorporating a curd containing column some 20% to

40% higher than a known tower.

- 6 A method of forming blocks of cheese from prepared cheese curd by utilising a
tower as claimed in claim 5 wherein a top section of the curd containing column is
5 substantially free of drain apertures.

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Fig 2

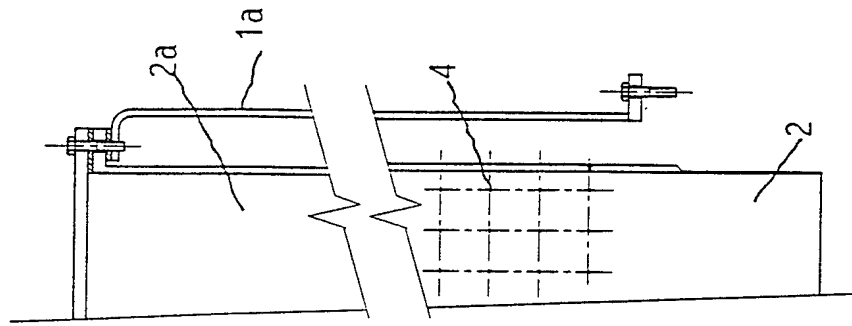


Fig 1

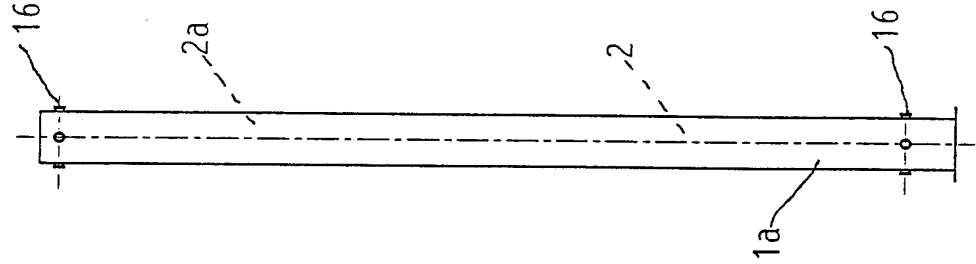


Fig 3

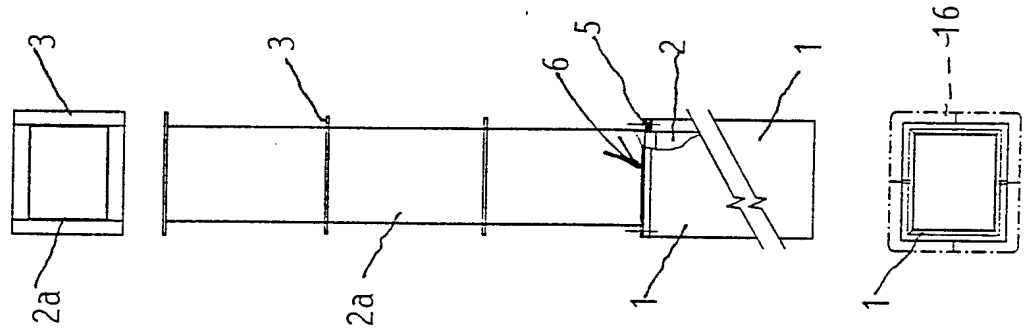


Fig 4

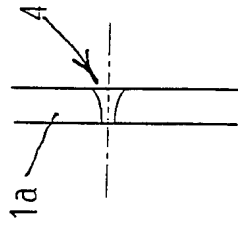
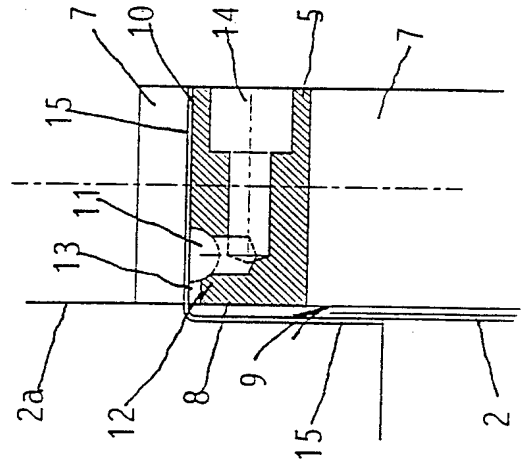
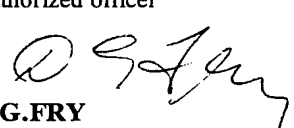


Fig 5



A. CLASSIFICATION OF SUBJECT MATTER Int. Cl. ⁵ A01J 25/00 A23C 19/00 According to International Patent Classification (IPC) or to both national classification and IPC												
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC A01J 25/00 A23C 19/00 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC AS ABOVE Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)												
C. DOCUMENTS CONSIDERED TO BE RELEVANT												
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.										
A	US,A, 4,942,052 (POSDAL) 17 JULY 1990 (17.7.90) entire document	1 & 3										
A	US,A, 4,152,101 (CHARLES) 1 MAY 1979 (1.5.79) entire document	1 & 3										
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<div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. </div> <div> <input checked="" type="checkbox"/> See patent family annex. </div> </div>												
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> * Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; vertical-align: top;"> <table style="border: none;"> <tr> <td style="width: 10%; text-align: center;">"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td style="text-align: center;">"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td style="text-align: center;">"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td style="text-align: center;">"&"</td> <td>document member of the same patent family</td> </tr> </table> </td> </tr> </table>			* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	<table style="border: none;"> <tr> <td style="width: 10%; text-align: center;">"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td style="text-align: center;">"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td style="text-align: center;">"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td style="text-align: center;">"&"</td> <td>document member of the same patent family</td> </tr> </table>	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"&"	document member of the same patent family
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Date of the actual completion of the international search 16 SEPTEMBER 1994 (16.09.94)		Date of mailing of the international search report <div style="text-align: right;">20.09.94</div>										
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. 06 2853929		Authorized officer <div style="text-align: center;">  D.G.FRY </div> Telephone No. (06) 2832130										

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
A	US,A, 3,468,026 (ROBERTSON & CHARLES) 23 SEPTEMBER 1969 (23.9.69) entire document	1 & 3
A	US,A, 2,982,655 (BUDDF CHAPMAN) 2 MAY 1961 (2.5.61) entire document	1 & 3

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Patent Document Cited in Search Report		Patent Family Member					
GB	2125674	AU US	18336/83 4539902	CA	1209399	NZ	205287
US	4152101	AT CA FI IT	2406/76 1085673 760837 1058735	AU DE FR	12572/76 2612938 2305930	BE DK GB	840192 1300/76 1542844
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